

CLAIMS

What is claimed is:

1. A video mail server comprising:

a video call signaling module coupled to an internet protocol network via an internet protocol services module for:

establishing a first internet protocol channel with a caller remote internet video device to support a recording session over the internet protocol network; and

establishing a second internet protocol channel with a user remote internet video device to support a playback session over the internet protocol network;

a media interface coupled to the internet protocol network via the internet protocol services module and comprising:

a recording module for obtaining a recording sequence of compressed images representing motion video from the caller remote internet video device and storing a video mail file representing the recording sequence of compressed images in a storage; each compressed image frame within the video mail file being one of:

an independent frame from which a video image frame can be recovered utilizing only the independent frame; and

a dependent frame from which the video image frame can only be recovered utilizing both the dependent frame and an independent frame preceding the dependent frame in the sequence;

a play back module for retrieving the video mail file and transferring contents of the video mail file as the playback sequence of compressed images to the user remote internet video device.

2. The video mail server of claim 1, further comprising:

a video codec coupled to the media interface and comprising a decoder module and an encoder module;

the decoder module:

receiving the recording sequence of compressed images from the recording module; and

7 decoding the recording sequence of compressed images to generate
8 motion video images;
9 the encoder module:
10 encoding the motion video images into the playback sequence of
11 compressed images, the playback sequence of compressed images being in a robust
12 format that requires that at least one independent frame be included within each fixed
13 time duration; and
14 transferring the playback sequence of compressed images to the media
15 interface for storing as the video mail file.
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1 3. The video mail server of claim 2, wherein
2 wherein the robust format requires that the duration of time between each
3 independent frame be a fixed period of time on the order of one second.
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1 4. The video mail server of claim 1:
2 wherein the video mail file comprises the recording sequence of compressed
3 images; and
4 wherein the video mail server further comprises:
5 a video codec coupled to the media interface and comprising a decoder
6 module and an encoder module, the decoder module:
7 receiving the recording sequence of compressed images from the
8 playback module;
9 decoding the recording sequence of compressed images to generate
10 motion video images; and
11 the encoding module:
12 generating the playback sequence of compressed images; and
13 transferring the playback sequence of compressed images to the media
14 interface for transferring to the user remote internet device.
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1 5. The video mail server of claim 4:

2 wherein the playback sequence of compressed images is in a robust format that
3 requires that at least one independent frame be included within each fixed time
4 duration.

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6 6. The video mail server of claim 5, wherein the robust format requires that the
7 duration of time between each independent frame be a fixed period of time on the order
8 of one second.

9 7. The video mail server of claim 4, wherein:
10 the playback module receives a lost frame message from the user remote
11 internet video device when the user remote internet video device detects loss of a frame
12 within the playback sequence of compressed images; and
13 video codec:
14 compresses a next image frame of the motion video images as an
15 independent frame in response to the playback module receiving a lost frame message
16 ; and
17 includes the next image frame in the playback sequence of compressed
18 images.

19 8. The video mail server of claim 1:
20 wherein the video mail file comprises the recording sequence of compressed
21 images;
22 wherein the video mail server further comprises:
23 a video codec coupled to the media interface and comprising a decoding
24 module and an encoding module, the decoding module:
25 receiving the recording sequence of compressed images from the
26 playback module;
27 decoding the recording sequence of compressed images to generate
28 motion video images; and
29 queuing each motion video image for encoding, by the encoding module,

as a lost frame correction frame; and
wherein the playback module comprises
a delay buffer for delaying the playback sequence of compressed images
for a period of time such that each frame within the playback sequence of compressed
images is queued for sending to the user remote internet device at a time that
corresponds to the motion video image queued for encoding by the encoding module as
a lost frame correction frame such that a lost frame correction frame may be substituted
for a frame in the playback sequence of compressed images in response to receiving an
lost frame message.

9. The video mail server of claim 1, wherein:

wherein the call signaling module establishes the second internet protocol
channel over a TCP/IP connection;
the internet protocol services module operates TCP/IP protocols to effect re-
transmission of any lost TCP/IP frames on the second TCP/IP connection; and
and the playback sequence of compressed images is the same as recording
sequence of compressed images.

10. The video mail server of claim 9, wherein:

wherein the call signaling module further establishes first internet protocol
channel over a TCP/IP connection; and
the internet protocol services module further operates TCP/IP protocols to effect
re-transmission of any lost TCP/IP frames on the first TCP/IP connection; and

11. The video mail server of claim 1:

wherein the call signaling module establishes the first internet protocol channel
over a TCP/IP connection and establishes the second internet protocol channel over a
UDP/IP channel;

wherein the internet protocol services module operates TCP/IP protocols to effect
re-transmission of any lost TCP/IP frames on the first internet protocol channel;
wherein the video mail file comprises the recording sequence of compressed

8 images: and
9 wherein the video mail server further comprises:
10 a video codec coupled to the media interface and comprising a decoder
11 module and an encoder module, the decoder module:
12 receiving the recording sequence of compressed images from the
13 playback module;
14 decoding the recording sequence of compressed images to generate
15 motion video images;
16 generating the playback sequence of compressed images; and
17 transferring the playback sequence of compressed images to the media
18 interface for transferring to the user remote internet device.

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1 12. The video mail server of claim 11, wherein the playback sequence of
2 compressed images is in a robust format that requires that at least one independent
3 frame be included within each fixed time duration.

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1 13. The video mail server of claim 12, wherein the robust format requires that the
2 duration of time between each independent frame be a fixed time interval on the order
3 of one second.

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1 14. The video mail server of claim 11, wherein:
2 the playback module receives a lost frame message from the user remote
3 internet video device when the user remote internet video device detects frame loss;
4 and
5 the video codec:
6 compresses a next image frame of the motion video images as an
7 independent format in response to the playback module receiving a lost frame
8 message; and
9 includes the next image frame in the playback sequence of compressed
10 images.

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1 15. The video mail server of claim 1:

2 wherein the call signaling module establishes the first internet protocol channel
3 over a TCP/IP connection and to establish the second internet protocol channel over a
4 UDP/IP channel;

5 wherein the internet protocol services module operates TCP/IP protocols to effect
6 re-transmission of any lost TCP/IP frames on first TCP/IP connection;

7 wherein the video mail file comprises the recording sequence of compressed
8 images:

9 wherein the video mail server further comprises a video codec coupled to the
10 media interface and comprising a decoder module and an encoder module;

11 the decoder module:

12 receiving the recording sequence of compressed images from the
13 playback module;

14 decoding the recording sequence of compressed images to generate
15 motion video images;

16 queuing each motion video image for encoding as an error correction
17 frame; and

18 wherein the playback module comprises:

19 a delay buffer for delaying the playback sequence of compressed images
20 for a period of time such that each frame within the playback sequence of compressed
21 images is queued for sending to the user remote internet device at a time that
22 corresponds to the video image frame queued for encoding by the encoding module as
23 a lost frame correction frame such that the lost frame correction frame may be
24 substituted for a frame in the playback sequence of compressed images in response to
25 receiving a lost frame message.

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1 16. A method of recording and playing back video mail, the method comprising:

2 establishing a first internet protocol channel with a caller remote internet video
3 device to support a recording session over the internet protocol network;

4 establishing a second internet protocol channel with a user remote internet video
5 device to support a playback session over the internet protocol network;
6 obtaining a recording sequence of compressed images from the caller remote
7 internet video device;

8 storing a video mail file representing the recording sequence of compressed
9 images in a storage; each compressed image frame within the video mail file being one
10 of:

11 an independent frame from which an image frame can be recovered
12 utilizing only the independent frame; and

13 a dependent frame from which the image frame can only be recovered
14 utilizing both the dependent frame and an independent frame preceding the dependent
15 frame in the sequence;

16 retrieving the video mail file and transferring contents of the video mail file as the
17 playback sequence of compressed images to the user remote internet video device.

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1 17. The method of claim 16, further comprising:

2 decoding the recording sequence of compressed images to generate motion
3 video images;

4 encoding the motion video images into the playback sequence of compressed
5 images, the playback sequence of compressed images being in a robust format that
6 requires that at least one independent frame be included within each fixed time
7 duration; and

8 storing the playback sequence of compressed images as the video mail file.
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1 18. The method of claim 17, wherein the robust format requires that the duration of
2 time between each independent frame be a fixed period of time on the order of one
3 second.
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1 19. The method of claim 16 wherein:

2 the video mail file comprises the recording sequence of compressed images; and

the method further comprises:

decoding the recording sequence of compressed images to generate motion video images; and
encoding the motion video images to generating the playback sequence of compressed images; and
transferring the playback sequence of compressed images to the user remote internet device.

20. The method of claim 19, wherein the playback sequence of compressed images comprises is in a robust format that requires that at least one independent frame be included within each fixed time duration.

21. The method of claim 20, wherein the robust format requires that the duration of time between each independent frame be a fixed period of time on the order of one second.

22. The method of claim 19, further comprising:
receiving a lost frame message from the user remote internet video device when the user remote internet video device detects loss of a frame within the playback sequence of compressed images;
compressing a next image frame of the motion video images as an independent frame in response to receiving an lost frame message; and
including the next image frame in the playback sequence of compressed images.

23. The method of claim 16, wherein:
the video mail file comprises the recording sequence of compressed images; and
the method further comprises:
decoding the recording sequence of compressed images to generate motion video images;
queuing each motion video image for encoding as a lost frame correction

7 frame; and

8 delaying the playback sequence of compressed images for a period of
9 time such that each frame within the playback sequence of compressed images is
10 queued for sending to the user remote internet device at a time that corresponds to the
11 motion video image queued for encoding as a lost frame correction frame such that an
12 lost frame correction frame may be substituted for a frame in the playback sequence of
13 compressed images in response to receiving an lost frame message.

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1 24. The method of claim 16, wherein the method further includes:

2 establishing each of the second internet protocol channel over a TCP/IP
3 connection; and

4 and the playback sequence of compressed images is the same as recording
5 sequence of compressed images.

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1 25. The method of claim 24, wherein the method further includes:

2 establishing each the first internet protocol channel over a TCP/IP connection.

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1 26. The method of claim 16, wherein :

2 the video mail file comprises the recording sequence of compressed images; and
3 the method further includes:

4 establishing the first internet protocol channel over a TCP/IP connection
5 and establishing the second internet protocol channel over a UDP/IP channel;

6 decoding the recording sequence of compressed images from the video
7 mail file to generate motion video images;

8 encoding the motion video images to generate the playback sequence of
9 compressed images; and

10 transferring the playback sequence of compressed images to the user
11 remote internet device.

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1 27. The method of claim 26, wherein the playback sequence of compressed images

is in a robust format that requires that at least one independent frame be included within each fixed time duration.

28. The method of claim 27, wherein the robust format requires that the time duration between each independent frame be a fixed period of time on the order of one second.

29. The method of claim 26, wherein the method further comprises:

receiving a lost frame message from the user remote internet video device when the user remote internet video device detects loss of a frame within the play back sequence of compressed images;

compressing a next image frame in the sequence of motion video images as an independent frame in response to receiving an lost frame message; and

including the next image frame in the play back sequence of compressed images.

31. The method of claim 16 wherein:

the video mail file comprises the recording sequence of compressed images; and the method further comprises:

establishing the first internet protocol channel over a TCP/IP connection and to establish the second internet protocol channel over a UDP/IP channel;

decoding the recording sequence of compressed images to generate motion video image;

queuing each motion video image for encoding as a lost frame correction frame; and

delaying the playback sequence of compressed images for a period of time such that each frame within the playback sequence of compressed images is queued for sending to the user remote internet device at a time that corresponds to the motion video image queued for encoding as a lost frame correction frame such that an lost frame correction frame may be substituted for a frame in the playback sequence of compressed images in response to receiving an lost frame message.